

**Amendments to the Claims:**

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1 (previously presented): An isolated nucleic Acid selected from the group consisting of: (a) a nucleic acid comprising the polynucleotide of SEQ ID NO:5 and (b) a nucleic acid completely complementary to the polynucleotide of (a).

Claim 2 (canceled)

Claim 3 (previously presented): The isolated nucleic acid of claim 1, wherein said isolated nucleic acid encodes a functionally active elongase which utilizes a polyunsaturated fatty acid as a substrate.

Claim 4 (previously presented): The isolated nucleic acid of claim 1, wherein said isolated nucleic acid is derived from a mammal.

Claim 5 (previously presented) The isolated nucleic acid of claim 4, wherein said isolated nucleic acid is derived from a mouse.

Claim 6 (withdrawn): A purified protein encoded by said nucleotide sequence of claims 1 or 2.

Claim 7 (withdrawn): A purified polypeptide which elongates polyunsaturated fatty acids and has at least about 30% amino acid similarity to the amino acid sequence of said purified protein of claim 6.

Claim 8 (previously presented): A method of producing an elongase enzyme comprising the steps of:

- a) isolating a polynucleotide comprising the nucleotide sequence of SEQ ID NO:5 or SEQ ID NO:6;

- b) constructing a vector comprising said polynucleotide of step (a) operably linked to a promoter; and
- c) introducing said vector into a host cell for a time and under conditions sufficient for expression of said elongase enzyme.

Claim 9 (original): The method of claim 8 wherein said host cell is selected from the group consisting of a eukaryotic cell or a prokaryotic cell.

Claim 10 (original): The method of claim 9 wherein said prokaryotic cell is selected from the group consisting of E. coli, cyanobacteria, and B. subtilis.

Claim 11 (original): The method of claim 9 wherein said eukaryotic cell is selected from the group consisting of a mammalian cell, an insect cell, a plant cell and a fungal cell.

Claim 12 (original): The method of claim 11 wherein said fungal cell is selected from the group consisting of Saccharomyces spp., Candida spp., Lipomyces starkey, Yarrowia spp., Kluyveromyces spp., Hansenula spp., Aspergillus spp., Penicillium spp., Neurospora spp., Trichoderma spp. and Pichia spp.

Claim 13 (original): The method of claim 12 wherein said fungal cell is a yeast cell selected from the group consisting of Saccharomyces spp., Candida spp., Hansenula spp. and Pichia spp.

Claim 14 (original): The method of claim 13 wherein said yeast cell is Saccharomyces cerevisiae.

Claim 15 (previously presented): A vector comprising a polynucleotide operably linked to a promoter, wherein said polynucleotide comprises the nucleotide sequence of SEQ ID NO:5.

Claim 16 (previously presented): A host cell comprising the vector of claim 15.

Claim 17 (originally presented): The host cell of claim 16, wherein said host cell is selected from the group consisting of a eukaryotic cell or a prokaryotic cell.

Claim 18 (originally presented): The host cell of claim 17 wherein said prokaryotic cell is selected from the group consisting of E. coli, Cyanobacteria, and B. subtilis.

Claim 19 (originally presented): The host cell of claim 17 wherein said eukaryotic cell is selected from the group consisting of a mammalian cell, an insect cell, a plant cell and a fungal cell.

Claim 20 (originally presented): The host cell of claim 19 wherein said fungal cell is selected from the group consisting of Saccharomyces spp., Candida spp., Lipomyces starkey, Yarrowia spp., Kluyveromyces spp., Hansenula spp., Aspergillus spp., Penicillium spp., Neurospora spp., Trichoderma spp. and Pichia spp.

Claim 21 (originally presented): The host cell of claim 20 wherein said fungal cell is a yeast cell selected from the group consisting of Saccharomyces spp., Candida spp., Hansenula spp. and Pichia spp.

Claim 22 (originally presented): The host cell of claim 21 wherein said host cell is Saccharomyces cerevisiae.

Claim 23 (previously presented): A plant cell, plant or plant tissue comprising the vector of claim 15, wherein expression of the polynucleotide of said vector results in production of a polyunsaturated fatty acid by said plant cell, plant or plant tissue.

Claim 24 (previously presented): The plant cell, plant or plant tissue of claim 23, wherein said polyunsaturated fatty acid is selected from the group consisting of arachidonic acid (AA), adrenic acid (ADA),  $\gamma$ -linoleic acid (GLA) and stearidonic acid (STA).

Claim 25 (withdrawn): One or more plant oils or acids expressed by said plant cell, plant or plant tissue of claim 23.

Claim 26 (withdrawn): A transgenic plant comprising said vector of claim 15, wherein expression of said nucleotide sequence of said vector results in production of a polyunsaturated fatty acid in seeds of said transgenic plant.

Claim 27 (withdrawn): A transgenic, non-human mammal whose genome comprises a DNA sequence encoding an elongase, operably linked to a promoter, wherein said DNA sequence comprises SEQ ID NO:5 (Figure 54).

Claim 28 (withdrawn): A fluid produced by said transgenic, non-human mammal of claim 27 wherein said fluid comprises a detectable level of at least one elongase or products thereof.

Claim 29 (withdrawn): A method for producing a polyunsaturated fatty acid comprising the steps of:

- a) isolating a nucleotide sequence comprising SEQ ID NO:5 (Figure 54);
- b) constructing a vector comprising said isolated nucleotide sequence;
- c) introducing said vector into a host cell under time and conditions sufficient for expression of an elongase enzyme encoded by said isolated nucleotide sequence; and

d) exposing said expressed elongase enzyme to a substrate polyunsaturated fatty acid in order to convert said substrate to a product polyunsaturated fatty acid.

Claim 30 (withdrawn): The method according to claim 29, wherein said substrate polyunsaturated fatty acid is selected from the group consisting of GLA, STA, AA, ADA and ALA, and said product polyunsaturated fatty acid is selected from the group consisting of DGLA, 20:4n-3, ADA,  $\omega$ 6-docosapentaenoic acid and STA, respectively.

Claim 31 (withdrawn): The method according to claim 29 further comprising the step of exposing said expressed elongase enzyme to at least one desaturase in order to convert said product polyunsaturated fatty acid to another polyunsaturated fatty acid.

Claim 32 (withdrawn): The method according to claim 31 wherein said product polyunsaturated fatty acid is selected from the group consisting of DGLA, 20:4n-3, ADA and  $\omega$ 6-docosapentaenoic acid, said another polyunsaturated fatty acid is selected from the group consisting of AA, EPA,  $\omega$ 6-docosapentaenoic acid and docosahexaenoic acid respectively, and said at least one desaturase is  $\Delta$ 5-desaturase with respect to production of AA or EPA, and  $\Delta$ 4-desaturase with respect to production of  $\omega$ 6-docosapentaenoic acid, and  $\Delta$ 19-desaturase with respect to production of docosahexaenoic acid.

Claim 33 (withdrawn): The method of claim 32 further comprising the step of exposing said another polyunsaturated fatty acid to one or more enzymes selected from the group consisting of at least one elongase and at least one additional desaturase in order to convert said

another polyunsaturated fatty acid to a final polyunsaturated fatty acid.

Claim 34 (withdrawn): The method of claim 33 wherein said final polyunsaturated fatty acid is selected from the group consisting of ADA,  $\omega$ 3-docosapentaenoic acid and docosahexaenoic acid.

Claim 35 (withdrawn): A nutritional composition comprising at least one polyunsaturated fatty acid selected from the group consisting of said product polyunsaturated fatty acid produced according to the method of claim 29, said another polyunsaturated fatty acid produced according to the method of claim 31, and said final polyunsaturated fatty acid produced according to the method of claim 33.

Claim 36 (withdrawn): The nutritional composition of claim 35 wherein said product polyunsaturated fatty acid is selected from the group consisting of DGLA, 20:4n-3, ADA,  $\omega$ 6-docosapentaenoic acid and STA.

Claim 37 (withdrawn): The nutritional composition of claim 35 wherein said another polyunsaturated fatty acid is selected from the group consisting of AA, EPA,  $\omega$ 6-docosapentaenoic acid and docosahexaenoic acid.

Claim 38 (withdrawn): The nutritional composition of claim 35 wherein said final polyunsaturated fatty acid is selected from the group consisting of ADA,  $\omega$ 3-docosapentaenoic acid and docosahexaenoic acid.

Claim 39 (withdrawn): The nutritional composition of claim 35 wherein said nutritional composition is selected from the group consisting of an infant formula, a dietary supplement and a dietary substitute.

Claim 40 (withdrawn): A pharmaceutical composition comprising 1) at least one polyunsaturated fatty acid selected from the group consisting of said product

polyunsaturated fatty acid produced according to the method of claim 29, said another polyunsaturated fatty acid produced according to the method of claim 31, and said final polyunsaturated fatty acid produced according to the method of claim 33 and 2) a pharmaceutically acceptable carrier.

Claim 41 (withdrawn): An animal feed comprising at least one polyunsaturated fatty acid selected from the group consisting of said product polyunsaturated fatty acid produced according to the method of claim 29, said another polyunsaturated fatty acid produced according to the method of claim 31 and said final polyunsaturated fatty acid produced according to the method of claim 33.

Claim 42 (withdrawn): The animal feed of claim 41 wherein said product polyunsaturated fatty acid is selected from the group consisting of DGLA, 20:4n-3, ADA,  $\omega$ 6-docosapentaenoic acid and STA.

Claim 43 (withdrawn): The animal feed of claim 41 wherein said another polyunsaturated fatty acid is selected from the group consisting of AA, EPA,  $\omega$ 6-docosapentaenoic acid and docosahexaenoic acid.

Claim 44 (withdrawn): The animal feed of claim 41 wherein said final polyunsaturated fatty acid is selected from the group consisting of ADA,  $\omega$ 3-docosapentaenoic acid and docosahexaenoic acid.

Claim 45 (withdrawn): A cosmetic comprising a polyunsaturated fatty acid selected from the group consisting of said product polyunsaturated fatty acid produced according to the method of claim 29, said another polyunsaturated fatty acid produced according to the method of claim 31 and said final polyunsaturated fatty acid produced according to the method of claim 33.

Claim 46 (withdrawn): A method of preventing or treating a condition caused by insufficient intake of polyunsaturated fatty acids comprising administering to said patient said nutritional composition of claim 35 in an amount sufficient to effect said prevention or treatment.

Claim 47 (previously presented): An isolated nucleic Acid selected from the group consisting of: (a) a nucleic acid comprising the polynucleotide of SEQ ID NO:6 and (b) a nucleic acid completely complementary to the polynucleotide of (a).

Claim 48 (canceled)

Claim 49 (withdrawn): A purified protein encoded by said polynucleotide of claim 47.

Claim 50 (presently amended): An isolated polynucleotide encoding a polypeptide, wherein said polypeptide has elongase activity and comprises an amino acid sequence which is at least 70% similar to the histidine box region of the amino acid sequence set forth in SEQ ID NO:63.

Claim 51 (presently amended): An isolated Polynucleotide encoding a polypeptide, wherein said polypeptide has elongase activity and comprises an amino acid sequence which is at least 70% similar to the histidine box region of the amino acid sequence set forth in SEQ ID NO:64.

Claim 52 (presently amended): An isolated polynucleotide encoding a polypeptide, wherein said polypeptide has elongase activity and comprises an amino acid sequence which is at least 60% identical to the histidine box region of the amino acid sequence set forth in SEQ ID NO:63.



Claim 53 (presently amended): An isolated polynucleotide encoding a polypeptide, wherein said polypeptide has elongase activity and comprises an amino acid sequence which is at least 60% identical to the histidine box region of the amino acid sequence set forth in SEQ ID NO:64.